Temporal and Spatial Characteristics of Particulate Organic Matter in a Coral Reef Ecosystem

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Particulate organic matter (POM) is considered as a major food source of grazing food chain for zooplanktons in coral reefs. However, POM is comprised of various components, such as living (e.g., phytoplankton, bacteria) and non-living materials (e.g., feces, corpse). A notable characteristic of POM in coral reefs is that a substantial amount of coral mucus is constantly transported into the POM fraction[1]. Thus, it is assumable that the POM composition may fluctuate in response to time and location even within a reef area. For better evaluation of the trophic importance of POM, this study aimed to understand spatial and temporal characteristics of POM by isotopic and biomarker analyses. Water samples were collected from different depths, places, date and time at a fringing reef in Malaysia in 2012 and 2013. Coral mucus, terrestrial water and surface sediment were also collected as comparative samples. Regarding $\delta^{13}C$ and the concentrations of biomarkers, more apparent tendency was observed among locations and depths than among time and dates. Indeed, the concentrations of sterols (e.g., campesterol, brassicasterol), brunched and mono unsaturated fatty acids were significantly higher at surface than bottom. TOC tended to gradually decrease toward offshore, and $\delta^{13}C$ of surface water was >1.0‰ heavier than bottom (ca. -18‰). Considering that coral mucus is rich in carbon with heavier carbon isotope (ca. -15‰) and that it contains most of the brunched fatty acids and sterols typically found in POM, our results indicated that POM in the surface water of reef area is largely influenced by both aggregation of coral mucus and indirect enhancement of biological activity derived from coral mucus, or indirectly activated biological production by the input of coral mucus, which promotes bacterial production[2].

[1] Wild *et al* (2004) *Nature* **428**, 66-70. [2] Nakajima *et al* (2009) *Aquat Ecol* **43**, 815-823.